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NOTES ON THREE SPECIES OF ANTHOCORIDAE (HEMIPTERA: HETEROPTERA) FROM HAWAII, INCLUDING THE FIRST RECORD OF *BUCHANANIELLA CONTINUA* (WHITE)

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Abstract.—Three species of Anthocoridae (Hemiptera: Heteroptera) are reported from a study of the palila bird *Loxioides bailleui* (Oustalet) on the island of Hawaii: *Amphiareus constrictus* (Stål), *Buchananiella continua* (White), and *Orius tristicolor* (White). All are non-indigenous and *B. continua* is a species not previously reported from the Hawaiian Islands, making a total of 21 species known there, of which 15 are non-indigenous.

Key Words: Anthocoridae, Hawaiian Islands, non-indigenous species, introductions

The insect fauna of the Hawaiian islands is large and diverse. Eldredge and Miller (1997) reported 7,979 species, including 2,582 that were non-indigenous (32%), likely the highest percentage we know in the world. Taxa within the Insecta display different percentages of introduced species as evidenced by the minute pirate bugs. The family Anthocoridae, or minute pirate bugs, contains 20 reported species in Hawaii that includes 14 introduced species - 70% (Asquith and Messing 1992; Nishida 1994; Eldredge and Miller 1995; Miller and Eldredge 1996; Eldredge and Miller 1997; Lattin 1999, 2000). The family contains small, usually predaceous, insects (~2.5 mm), that are found in a variety of habitats in association with living and dead plants and litter (Péricart 1972; Lattin 1999, 2000). Nishida (1994) reported 19 species from the Hawaiian Islands. *Montandoniola moraguesi* (Puton) should be added to that list. It was introduced in 1964 as a biological control agent against the newly introduced Cuban laurel thrips and quickly spread over several islands (Davis and Krauss 1965).

In this paper, we report *Orius tristicolor* (White), *Amphiareus constrictus* (Stål) (previously reported under the name *Cardiastethus fulvescens* (Walker) by Zimmerman 1948; Herring 1966), and *Buchananiella continua* (White) from the Hawaiian Islands.

MATERIALS AND METHODS

The specimens presented in this paper are from a long-term survey by the Biological Resources Division of the United States Geological Survey that is investigating the diet and prey items of the endangered palila bird, *Loxioides bailleui* (Oustalet) Part of the effort includes a series of studies of insects and their relatives found in the dry, montane woodland forest on the western slopes of Mauna Kea between 1,700 m and 2,835 m in elevation (5,580 ft–9,300 ft). Part of the study involves rearing insects from pods of the mamane tree, *Sophora chrysophylla* (Salisbury) Seeman, a major food item of palila (Scott et al. 1986). Mamane pods were collected monthly from October 1995 through April 1997 along an elevation gradient and placed in rearing cages covered with a fine mesh screen. As-

sociated insects were removed from the cages as they emerged from the pods, and placed in alcohol with appropriate documentation and labels. The specimens reported here were among those collected during that study. All Anthocoridae specimens were examined and identified by JDL. Specimens will be deposited with the B. P. Bishop Museum in Honolulu, Hawaii.

Orius tristicolor (White)

Orius tristicolor, was introduced from Arizona into Oahu (Davis and Krauss 1965), where, according to Clausen (1978), it failed to become established. Our specimens from the collections made in 1996 on Hawaii reconfirm the establishment of *O. tristicolor* in Hawaii. Described from California by White (1879), *O. tristicolor* is widely distributed in western North America and has a range that extends to South America (Herring 1966b). The male genitalia of *O. tristicolor* are distinct from those of *O. insidious* (Say), another species of *Orius* also introduced into the Hawaiian Islands (Kauai and Oahu) (Weber 1953). It, too, was considered not to have become established (Oatman 1978), but Takara and Nishida (1981) have confirmed its establishment on the island of Oahu. The status of the endemic *Orius persequens* (White) and the introduced *O. pumilio* (Champion), the latter reported by Kirkaldy (1910) from Oahu, remains uncertain.

Amphiareus constrictus (Stål)

There is a single specimen of what appears to be *Amphiareus constrictus,* but it lacks the terminal segments of the abdomen. This species was previously reported by Zimmerman (1948) as *Cardiastethus fulvescens* (Walker), but see Herring (1966a) for clarification. Additional specimens are required for final documentation.

Buchananiella continua (White)

Originally described from the island of Madeira by White (1879), it has been introduced into many countries around the world. The female of *Buchananiella continua* (White) represents the first record for the Hawaiian Islands. While a male would be useful, the distinctive appearance of this species, including the short, semideclining setae on the dorsum; the pronotum with distinct calli having a transverse sulcus behind and the posterior half with a median, longitudinal impression; the two large, well-defined punctures on the scutellum; the indistinct punctures on the clavus and balance of the hemelytra; the shape of the ostiolar canal; and the characteristic omphalophore on the middle of the venter of abdominal segment VII (Péricart 1972) combine to provide positive identification.

The discovery of *Buchananiella continua* brings the total of species of Anthoridae to 21. Fifteen of these are introduced (71.4%), either accidentally or intentionally. These numbers indicate the vulnerability of the Hawaiian Islands to non-indigenous species. More intensive collecting in all parts of Hawaii likely will disclose additional exotic species. Much more work is needed to document the insect fauna of these unique, isolated, and vulnerable islands.

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